Inventorying diversity, use and conservation status of indigenous fruit and nut species of Nepal for developing 'conservation through use' strategies

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1. Introduction

Due to its exceptional diversity of topographic, climatic, and agro-ecological conditions, Nepal is considered one of the richest biodiversity hotspots of the world, including about 200 indigenous fruit and nut species.

These plants play a significant role, especially for the well-being of rural people through providing nutrition, household income and employment. Often, indigenous fruits and nuts are not domesticated or cultivated, but gathered from natural stands. However, many of these populations are said to be threatened and disappearing, due to deforestation and over-exploitation, among others.

This study aimed at contributing to the development of 'conservation through use' strategies for Nepal's indigenous fruit and nut species by determining their diversity, utilization and current conservation status.

Fig. 1. Research localities in different districts of Western, Central and Eastern Nepal.

2. Methods

In different climatic zones of Western, Central and Eastern Nepal, covering elevations from 200 to 4000 m asl. and climatic zones from tropical to subalpine, 15 districts and one village per district were randomly selected (Fig. 1).

In each village, indigenous fruit and nut species were surveyed in at least four homegardens as well as in forests, fallows, along roadsides, and in markets, if available. Information about the species' local names, life form, conservation status, seasonal availability, consumption patterns and market value was gathered by interviewing homegardeners, villagers and fruit traders, together with personal observations and reviewing literature.

Fig. 2. Picking of *Rubus ellipticus* (left) and *Mahonia napaulensis* (right) from natural vegetation in Nepal.

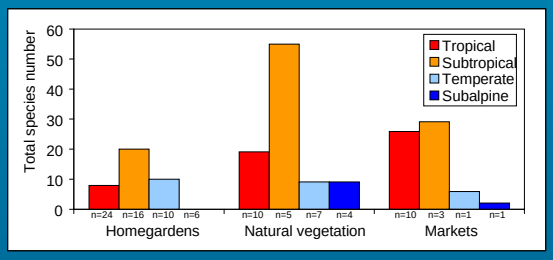

Fig. 3. Total number of indigenous fruit and nut species identified in home-gardens, natural vegetation and markets in different climatic zones of Nepal.

3. Results and Discussion

3.1 Field Survey

Overall 107 indigenous fruit and nut species were recorded in the field survey, of which 52 were trees, 32 shrubs, 11 climbers and 12 herbs. About 80% of these species were collected from natural or semi-natural vegetation, e.g., *Rubus* spp. or *Mahonia napaulensis* (Fig. 2).

In homegardens, only 24 indigenous fruit and nut species were grown, for example mango (*Mangifera indica*) or Indian wild pear (*Pyrus pashia*). Homegardens were rather dominated by exotic fruit species such as guava (*Psidium guajava*), pawpaw (*Carica papaya*) and custard apple (*Annona reticulata*), which all have a high market demand in Nepal.

In the subtropical zone, numbers of indigenous fruit and nut species in both homegardens and natural vegetation were higher than in tropical and temperate or subalpine zones (Fig. 3). This is because tropical and temperate fruit and nut species overlap in the region with subtropical climate.

3.2 Market Survey

About 40 indigenous fruit and nut species were available at the surveyed markets. Seasonal availability differs substantially with 1-5 species available in spring and late summer months only, but 13-17 species from May to June and again from September to December. Products of only five species were available year-round, mostly in dried form. In markets of the temperate and subalpine zones, much less species were available as compared to the tropical and subtropical zones (Fig. 3).

Fig. 4. Bel (*Aegle marmelos*) fruits (above) and symbolic marriage of Newar girls with bel fruits (left).

Fig. 5. Fruits of chiuri (*Bassia butyracea*).

3.3 Socio-Cultural Issues

Some indigenous fruits and nuts have a high cultural value and are very important for celebrating the traditional religion. For example, fruits of the bel tree *Aegle marmelos* are very important for the Newar tribe around Kathmandu to celebrate the festival of 'Ihee' or 'Bel Biha', when young girls are married to a certain bel fruit (Fig. 4). The bel fruit symbolizes the Hindu God Shiva and this marriage is considered to be everlasting.

Another example is the Chiuri tree (*Bassia butyracea*) (Fig. 5), which is a very important fruit for the Chepang tribe. Chepang families not owing a Chiuri tree are considered poor. The wedding gifts in this tribe always include a small Chiuri tree.

3.4 Conservation Issues

Availability, cultivation and use of indigenous fruit and nut species is declining, combined with genetic and cultural erosion. This is mainly due to:

- Land-use and climate change, unsustainable collection, and deforestation;
- Dominance of exotic fruits in horticulture research, extension and policy;
- Decline of market demand for indigenous species (change of eating habits in the young generation, and lack of marketing strategies);
- Lack of planting material and management knowledge for indigenous species.

Some fruit species are considered to be endangered, e.g., *Holboellia latifolia* and *Choerospondias axillaris* (Fig. 6).

4. Conclusions and Recommendations

Indigenous fruit and nut species have a high, but not fully exploited potential to improve livelihoods in Nepal. The following measures may help to further promote these species and to minimize genetic and cultural erosion:

- Collecting and conserving germplasm on-farm and in genebanks;
- Documenting the related indigenous knowledge;
- Analysing nutritional value and promoting their utilization and marketing;
- Domestication and development of proper management techniques.

Fig. 6. Fruits of *Holboellia latifolia* (left) and *Choerospondias axillaris* (right), two species considered endangered.

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